CLAIMS

What is claimed is:

1 1. A method for mirroring data between a plurality of sites, comprising:

2   establishing a replication relationship between the plurality of sites including a first

3   site and a second site;

4   replicating at least some changes made at any site of said plurality of sites at each

5   other site of said plurality of sites;

6   a first server associated with the first site requesting performance of a write operation;

7   in response to said request, performing the write operation at the first site, and

8   sending a message to request that the write operation be mirrored at the

9   second site;

10   the first server receiving an indication that the write operation could not be

11   successfully performed at the second site;

12   in response to the indication, the first server initiating a membership voting operation

13   to determine which of the first server and a second server associated with the

14   second site should be removed from said replication membership; and

15   if it is determined that the second server associated with the second site should be

16   removed from said replication membership, then the first server sending a

17   message to indicate that write operations are no longer to be replicated at said

18   second site.

1 2. The method of Claim 1, further comprising the steps of:

2   the second site rejoining the replication relationship; and

3   in response to said second site rejoining the replication relationship, causing data

4   associated with the second site to be resynchronized with data that resides at

5   the first site, and remounting a database associated with the second site at the

6   second site.

1   3.   The method of Claim 1, further comprising the step of:

2   if during the membership voting operation it is determined that the first site should be

3   removed from said replication membership, then informing the second site

4   that data is no longer to be replicated at the first site.

1   4.   The method of Claim 3, wherein the step of informing comprises:

2   at the second site informing a file server associated with the second site or the second

3   server that data is no longer to be replicated at the first site.

1   5.   The method of Claim 1, wherein the determination of which of the first server and the

2   second server associated with the second site should be removed from said replication

3   membership comprises determining which of the first server or the second server is

4   more important or more reliable.

1   6.   The method of Claim 1, further comprising the step of establishing a particular device

2   as a quorum device, and wherein the step of initiating a membership voting operation

3   comprises the steps of:

4   notifying the quorum device that the write operation could not be successfully

5   performed; and

6   the quorum device determining which of the first server and a second server

7   associated with the second site should be removed from said replication

8   membership.

1　7.　The method of Claim 6, wherein the quorum device comprises a plurality of mirrored

2　　devices, and the step of notifying the quorum device is performed by a primary file

3　　server, wherein the primary file server is a file server, associated with one of the

4　　plurality of sites, through which all other files servers associated with other sites in

5　　the plurality of sites communicate with the quorum device.

1　8.　The method of Claim 1, wherein the indication that the write operation could not be

2　　successfully performed at the second site is an input/output error that is received at

3　　the first server.

1　9.　The method of Claim 1, further comprising the step of:

2　　if a particular site of the plurality of sites becomes inoperable, then initiating recovery

3　　　of the particular site after it is determined that all messages transmitted from

4　　　the particular site to each other site of the plurality of sites have been received

5　　　at their destination.

1　10.　A machine-readable medium carrying one or more sequences of instructions for

2　　mirroring data between a plurality of sites, wherein execution of the one or more

3　　sequences of instructions by one or more processors causes the one or more

4　　processors to perform the steps of:

5　　establishing a replication relationship between the plurality of sites including a first

6　　　site and a second site;

7　　replicating at least some changes made at any site of said plurality of sites at each

8　　　other site of said plurality of sites;

9　　a first server associated with the first site requesting performance of a write operation;

10   in response to said request, performing the write operation at the first site, and

11   sending a message to request that the write operation be mirrored at the

12   second site;

13   the first server receiving an indication that the write operation could not be

14   successfully performed at the second site;

15   in response to the indication, the first server initiating a membership voting operation

16   to determine which of the first server and a second server associated with the

17   second site should be removed from said replication membership; and

18   if it is determined that the second server associated with the second site should be

19   removed from said replication membership, then the first server sending a

20   message to indicate that write operations are no longer to be replicated at said

21   second site.

1   11.   The machine-readable medium of Claim 10, wherein execution of the one or more

2   sequences of instructions by the one or more processors causes the one or more

3   processors to further perform the steps of:

4   the second site rejoining the replication relationship; and

5   in response to said second site rejoining the replication relationship, causing data

6   associated with the second site to be resynchronized with data that resides at

7   the first site, and remounting a database associated with the second site at the

8   second site.

1   12.   The machine-readable medium of Claim 10, wherein execution of the one or more

2   sequences of instructions by the one or more processors causes the one or more

3   processors to further perform the step of:

4   if during the membership voting operation it is determined that the first site should be

5   removed from said replication membership, then informing the second site

6   that data is no longer to be replicated at the first site.

1   13.   The machine-readable medium of Claim 12, wherein the step of informing comprises:

2   at the second site informing a file server associated with the second site or the second

3   server that data is no longer to be replicated at the first site.

1   14.   The machine-readable medium of Claim 10, wherein the determination of which of

2   the first server and the second server associated with the second site should be

3   removed from said replication membership comprises determining which of the first

4   server or the second server is more important or more reliable.

1   15.   The machine-readable medium of Claim 10, wherein execution of the one or more

2   sequences of instructions by the one or more processors causes the one or more

3   processors to further perform the step of:

4   establishing a particular device as a quorum device, and

5   wherein the step of initiating a membership voting operation comprises the steps of:

6   notifying the quorum device that the write operation could not be successfully

7   performed; and

8   the quorum device determining which of the first server and a second server

9   associated with the second site should be removed from said

10   replication membership.

1   16.   The machine-readable medium of Claim 15, wherein the quorum device comprises a

2   plurality of mirrored devices, and the step of notifying the quorum device is

3   performed by a primary file server, wherein the primary file server is a file server,

4   associated with one of the plurality of sites, through which all other files servers

5   associated with other sites in the plurality of sites communicate with the quorum

6   device.

1 17.   The machine-readable medium of Claim 10, wherein the indication that the write

2   operation could not be successfully performed at the second site is an input/output

3   error that is received at the first server.

1 18.   The machine-readable medium of Claim 10, wherein execution of the one or more

2   sequences of instructions by the one or more processors causes the one or more

3   processors to further perform the step of:

4   if a particular site of the plurality of sites becomes inoperable, then initiating recovery

5   of the particular site after it is determined that all messages transmitted from

6   the particular site to each other site of the plurality of sites have been received

7   at their destination.